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unit which constitutes the only distinctive basis for a definition of mysticism.

6. The mystical, then, is simply the automatic in general interpreted as ontological immediacy to any being whatever, divine, human, or subhuman. In strictness, the mystical is not a psychological term at all, since ontological interpretation is of its essence. Perhaps only a few psychologists are incautious at this point, but certainly the world of culture at the present day does sorely need to understand: *First,* That there is no distinctive "mystical experience," because the psychical factor in mysticism, the automatic, is entirely general, and not a kind of experience with distinctive content of its own. *Second,* That mysticism is not to be identified with religion or with any part of it. It is not true that all religion is mystical, or that all mysticism is religious.

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THE BASES FOR GENERALIZATIONS IN SCIENTIFIC METHODS

IN that all true induction involves generalizing on the basis of particulars, the question of the conditions under which various numbers of particulars are required for a generalization stands as a fundamental question in discussing inductive methods. There is no doubt that at times we are justified in making "sweeping statements" on small evidence, statements as to the quality of a certain brand of note-paper, for instance, on the evidence of a single small square; whereas at other times we ask for a more complete test, for a sample, perhaps, from the middle, the top, and the bottom of a barrel of apples, or for the examination of some hundreds of Italian immigrants, before we are ready to come to a conclusion. Several considerations seem to affect the investigator's judgment of the sufficient evidence for a generalization. The following classification attempts to group these in such wise as to suggest the questions one might well ask oneself before undertaking an investigation or criticizing a piece of work:

A. Only part of the field discussed is investigated.
  I. The field shows uniformity
    1. Over the field as a whole.
      a. Absolute.
        (1) Complete isolation possible by direct means.
        (2) Complete isolation possible by indirect means.
        (3) Delicate technique calls for repetition of experiments.
      b. General uniformity.

            (1), (2), (3), as under *a*.
        2. Within the several distinct portions of the field.
            a and *b*, as under 1.
    II. The field investigated shows relatively no uniformity.
        1. Standard conditions, variations quantitive.
        2. Conditions non-standard, or variations non-quantitive.
B. Whole field investigated.

When the total field *B*, is tested, either descriptions or complete inductions are drawn up. In such a case no real generalization is made; thus the interest of this paper centers in class *A*.

The most marked contrast within the field of generalization is between those cases where we draw our conclusions with apparently reckless trust in a few examples and those where we build our foundations very nearly as wide as the superstructure. Roughly, the difference is between the more exact sciences and the use of statistical methods. The difference itself seems to rest on the presence or absence of our confidence in the representative character of the different examples. When the field of investigation is uniform, as in the instance of the note-paper mentioned above, a small piece is enough to test, for we believe all paper will take the ink in the same way. On the other hand, if the field is as various as the physical condition of the school children of New York city, a conclusion to be of real value must rest on the study of some "quorum" of cases, the more the better.

There may be uniformity over the field investigated as a whole, or within the several distinct portions of it; that is, we may work with representatives at large or by districts. Number 2 under I. covers the latter case, that where we work with classes showing distinct kinds within them. We then select one example or a group of examples of each kind to test. The single example is no longer enough, but the group tested represents all divisions of the total field. Pasteur used this method in the first of his work with the disease pébrine.[1] One part of scientific investigation which calls most for judgment and wide knowledge centers around the question of the place of uniformity, the parts to be sampled, if one is to win a fair idea of the quality of,—let us say, a boatload of grain. Sometimes this method of using a carefully selected group is called into play where the investigator's interest is in pointing out or studying the very variation itself, in showing, for instance, that air in the Alps has fewer germs than air in the country, and that again than air in the city streets; or in determining the relative virulence of a medula oblongata infected with rabies, as it dries one, two, or three days. In all these cases, a group of examples representing each of the different kinds found in the class as a whole gives the material to work upon.

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[1] "The Life of Pasteur," R. Vallary-Raelot (McClure, Phillips, & Co., New York, 1906), pp. 118, 120.

Where such uniformity as is found belongs to the field as a whole (I., 1), it is true that we also sometimes call for a small group instead of a single example in testing for the nature of that field, but such a group is very different, from a logical point of view, from the selected group. Where complexity of condition, or ignorance, makes it impossible to be certain of discriminating the eccentric individual, several are tested—three, ten, or twenty guinea-pigs are inoculated—instead of only one. There is no selection here, variation is generally and vaguely accepted as possible, not specifically placed. Each example is believed representative of the whole, if a few examples agree. The headings *a* and *b* indicate the distinction in method between taking one example and such a small group. In testing the kinds of a field (I., 2), either of the two methods will be applied to the test for each kind, according to conditions. That is, we have subheadings *a* and *b* under 2 also.

The lowest subdivisions under I., the bracketed numerals, draw distinctions of method on a new basis, that of the character of the technique used in experimenting. It is frequently necessary to bring into play a number of examples of a field in question, not because no one of them is representative of the field, but because we have at our command only very complicated means for learning what we want to learn. In determining the charge of an electric corpuscle, for instance, it would be satisfactory to rest with the evidence of a single corpuscle, could it be gained directly. As things are, it is necessary to pass a charge of some strength through moist air, measure the quantity of water precipitated and the size of a single drop, and so compute the charge of a single corpuscle.[2] The reason for bringing into play in this case a much larger amount of electricity than is necessary to represent the field is that our instruments are not fine enough to deal with less. In biological work the number of animals used is multiplied similarly. A normal dog is inoculated with the virus every time that a refractory one is tested, because we have no other means of being sure of the condition of the virus. The conditions that lead to this use of a larger portion of the field because of imperfect technique, I have called those for indirect isolation. The conditions grouped under (3) are similar. Here we multiply our tests, perhaps because of the chance of breakage through a long experiment, or of some slip on our part in very delicate measurements or tests. Most experiments are, apparently, repeated for this reason before they are announced. In Pasteur's life, however, one instance is given where a single test was enough, that is, one instance of the method (1).[3] So far as I can understand it, the term "control experiment" is used not only for the side test called for under (2) and (3), but also for the multiple experiment, *b*. For the purposes of logic, we might wish it were kept for these subsidiary experiments required by the nature of the technique, for certainly that brings a new factor into play. This element enters, of course, to complicate the methods that fall under *b* and under 2 also.

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[2] "The New Knowledge," R. K. Duncan, Part III., Chap. VII.

When the field shows relatively no uniformity, the methods are quite different. The only distinction that I can find to note there is that which gives rise to the use of an arbitrarily created representative or a kind of lay figure, such as an average, or a mean. These are used where the ground of variation is quantitative and the conditions that lead to it relatively standard (II., 1). Much of the work done in computing the mean is, indeed, concerned with making the conditions standard. The nature and difficulties of this method are shown in the investigations of the effect of overcrowding upon the development of the school children of New York. So long as the conditions that determine variation are believed standard, that is, in play in all the groups compared, the use of averages to represent the different groups is legitimate, but under the suggestion that difference in race varied those conditions in part, belief in the genuineness of that representation withers away.

In such a case (II., 2) the methods left to use are those under *B,* with an important addition. Graphs, classifications (such as this tries to be), and tables are often drawn up for a whole field on the basis of a portion, usually a large portion, of that field. A step beyond complete induction is thus taken, a step such as Mendeléef took when he predicted that any chemical elements found later would fit into his table of the periodic law.

It will be wholly false to the facts to give the impression that I find the methods used in scientific investigations slip unquestionably and invariably under some one of these headings.· There are what may be called transition methods at play; as, perhaps, where one may be but half satisfied with the method of selected groups is to be abandoned for a representative at large, one tests two or three only, and not all the "kinds" within the field. Still I find that the distinctions noted here mark the main points to consider in forming a judgment of the amount of evidence needed if one is to generalize safely about a given field.

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[3] *Loc. cit.*, p. 39.